

CLAIMS

1           1. A method for making a superconducting metal  
2 oxide complex, comprising the steps of:  
3           mixing solid compounds containing L, M, A and O  
4 in amounts appropriate to yield the formula  $(L_{1-x}M_x)_aA_bO_y$ ,  
5 wherein L is lanthanum, lutetium, yttrium, scandium or a  
6 combination thereof; M is barium, strontium, calcium,  
7 magnesium, mercury or a combination thereof; A is copper,  
8 bismuth, titanium, tungsten, zirconium, tantalum, niobium,  
9 vanadium or a combination thereof; "a" is 1 to 2; "b" is  
10 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to  
11 about 4;

12           compacting the mixture into a solid mass by  
13 application of pressure from about 100 to about 30,000  
14 psi;

15           heating the solid mass in air to a temperature  
16 of from about 900 to about 1100°C for at least about 5  
17 minutes; and

18           quenching the solid mass to ambient temperature  
19 in air.

1           2. The method of claim 1, wherein L is yttrium, M  
2 is barium and A is copper.

1           3. The method of claim 2, wherein the mixture is  
2 compacted to a solid mass by application of pressure of  
3 from about 100 to about 500 psi.

1           4. The method of claim 3, wherein the solid mass is  
2 heated at 900-1100°C for a period of from about 5 to about  
3 15 minutes.

1           5. A superconducting metal oxide complex having the  
2 formula  $(L_{1-x}M_x)_aA_bO_y$  wherein L is lanthanum, lutetium,  
3 yttrium, scandium or a combination thereof; M is barium,  
4 strontium, calcium, magnesium, mercury or a combination

5 thereof; A is copper bismuth, titanium, tungsten,  
6 zirconium, tantalum, niobium, vanadium or a combination  
7 thereof; "a" is 1 to 2; "b" is 1; "x" is about 0.01 to  
8 about 0.5; and "y" is about 2 to about 4; said complex  
9 made by a process comprising the steps of:

10 mixing solid compounds containing L, M, A and O  
11 in amounts appropriate to yield the formula  $(L_{1-x}M_x)_aA_bO_y$ ,  
12 wherein L is lanthanum, lutetium, yttrium, scandium or a  
13 combination thereof; M is barium, strontium, calcium,  
14 magnesium, mercury or a combination thereof; A is copper,  
15 bismuth, titanium, tungsten, zirconium, tantalum, niobium,  
16 vanadium or a combination thereof; "a" is 1 to 2; "b" is  
17 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to  
18 about 4;

19 compacting the mixture into a solid mass by  
20 application of pressure from about 100 to about 30,000  
21 psi;

22 heating the solid mass in air to a temperature  
23 of from about 900 to about 1100°C for at least about 5  
24 minutes; and

25 quenching the solid mass to ambient temperature  
26 in air.

1 6. The complex of claim 5, wherein L is yttrium, M  
2 is barium and A is copper.

1 7. The complex of claim 6, wherein the mixture is  
2 compacted to a solid mass by application of pressure of  
3 from about 100 to about 500 psi.

1 8. The complex of claim 7, wherein the solid mass  
2 is heated at 900-1100°C for a period of from about 5 to  
3 about 15 minutes.

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1 9. A superconducting metal oxide structure,  
2 comprising:  
3 a copper substrate; and

1 a metal oxide complex deposited on said  
2 substrate, said complex having the formula  $(L_{1-x}M_x)_aA_bO_y$   
3 wherein L is lanthanum, lutetium, yttrium, scandium or a  
4 combination thereof; M is barium, strontium, calcium,  
5 magnesium, mercury or a combination thereof; A is copper,  
6 bismuth, titanium, tungsten, zirconium, tantalum, niobium,  
7 vanadium or a combination thereof; "a" is 1 to 2; "b" is  
8 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to  
9 about 4.

1 10. The structure of Claim 9, wherein the metal  
2 oxide complex has a first layered phase adjacent said  
3 copper substrate as a glossy insulating layer phase, a  
4 second superconducting phase layered on the first phase,  
5 and a third phase layered on the second phase which is an  
6 insulator phase.

1 11. The structure of claim 10, wherein L is yttrium,  
2 M is barium and A is copper.

1 12. A method for making a superconducting metal  
2 oxide complex, comprising the steps of:  
3 mixing solid compounds containing L, M, A and O  
4 in amounts appropriate to yield the formula  $(L_{1-x}M_x)_aA_bO_y$ ,  
5 wherein L is lanthanum, lutetium, yttrium, scandium or a  
6 combination thereof; M is barium, strontium, calcium,  
7 magnesium, mercury or a combination thereof; A is copper,  
8 bismuth, titanium, tungsten, zirconium, tantalum, niobium,  
9 vanadium or a combination thereof; "a" is 1 to 2; "b" is  
10 1; "x" is about 0.01 to about 0.5; and "y" is about 2 to  
11 about 4;  
12 depositing the mixture on a copper substrate;  
13 compressing the mixture on the copper substrate  
14 to form the oxide mixture into a layer on the copper  
15 substrate;

16 heating the substrate and oxide mixture layer  
17 thereon to a temperature of from about 900 to 1100°C for  
18 at least about 5 minutes; and  
19 quenching the substrate and oxide mixture layer  
20 thereon to ambient temperature in air.

sub. A/

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add  
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